

40. (Previously Added) The switch of Claim 35, wherein each cantilevered arm is made from a material selected from the group of single crystal silicon, polycrystalline silicon, silicon dioxide, or silicon nitride.

41. (Previously Added) The switch of Claim 35, wherein each cantilevered arm is spaced from the substrate by means of an extension of the arm extending substantially vertically from the substrate.

42. (Previously Added) The switch of Claim 35, wherein the arms of each pair have different thermal expansion properties.

II. REMARKS

This Application has been carefully reviewed in light of the Final Office Action mailed May 30, 2002. At the time of the Final Office Action, Claims 1, 4-9, 17, 20-24 and 31-42 were pending in this Application. Claims 1, 5, 8, 9, 17, 21, 24, and 31-42 were rejected by the Examiner. Claims 4, 6, 7, 20, 22, and 23 were objected to by the Examiner as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitation of the base claim and any intervening claims.

Rejections under 35 U.S.C. §102(e)

Claims 1, 5, 8, 9, 17, 21, 24, 31-37 and 39-42 stand rejected by the Examiner under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,360,036 issued to James G. Couillard (hereinafter "Couillard").

Applicants have amended the independent claims, which are Claims 1, 17, and 35. As explained below, Applicants submit that there are patentable distinctions between the present claims and the invention of Couillard.

Claim 1 and Its Dependent Claims

Specifically, Claim 1 has been amended to more clearly recite the manner in which the reflective surfaces relate to the optical fibers. As amended, Claim 1 makes clear that the optical fibers are discrete from the substrate upon which the optical actuators are fabricated. The optical fibers are arranged around the perimeter of the substrate. Claim 1 further claims lenses interposed between the optical fibers and the substrate.

In contrast, in the invention of Couillard, the waveguides are integral to the substrate. The waveguides and the switches are fabricated on separate wafers and bonded together on a common substrate. (Col. 4, lines 24 - 55). No lenses are necessary or practicable for this design.

The invention of Couillard would not be operable for optical fibers arranged around its substrate. The reflective surfaces of Couillard move downwardly into slots and would not be capable of intercepting the path of optical fibers arranged around the substrate.

Claims 5, 8, 9, 31, and 32 are dependent on Claim 1 and are allowable for the same reasons as Claim 1.

Claim 17 and Its Dependent Claims

Claim 17 has been amended to recite that both the upper and lower surfaces of the actuator arm have a layer of material having a different thermal expansion property. This incorporates the common limitation of Claims 22 and 23, and

does not introduce new matter or require new searching.

Claims 21, 24, 33, and 34 are dependent on Claim 17 and are allowable for the same reasons as Claim 17.

Claim 35 and Its Dependent Claims

Claim 35 recites the embodiment of Figure 7, which has two arms for each actuator. It recites that each arm has a fixed end attached to the substrate.

Contrary to the Examiner's position, Figure 30 of Couillard does not show a pair of arms. Figure 30 is one of a series of figures (Figures 14 - 31) that illustrate the fabrication of the switches. Arm 40 in Figure 30 is the same as arm 40 in Figures 20 - 31. This arm 40 has only a single fixed end.

Claims 36 - 42 are dependent on Claim 35 and are allowable for the same reasons as Claim 35.

III. CONCLUSION

Applicants appreciate the Examiner's careful review of the application. Applicants have made an earnest effort to place this case in condition for allowance in light of the amendments and remarks set forth above. For the foregoing reasons, Applicants respectfully request reconsideration of the rejections and full allowance of Claims 1, 4-9, 17, 20-24 and 31-42.

A Change of Correspondence Address is being filed with this Response.

Attached hereto is a marked-up version of the changes made to the claims by the current amendments. The attached pages are captioned "**Version with Markings to Show Changes Made**".

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The Commissioner is hereby authorized to charge any fees or credit any overpayments to Deposit Account No. 50-2148 of Baker Botts L.L.P.

If there are any matters concerning this application that may be cleared up in a telephone conversation, please contact Applicants' attorney at 512.322.2634.

Respectfully submitted,

BAKER BOTTS L.L.P.  
Attorneys for Applicants

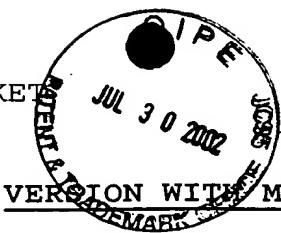
*Ann Livingston*

Ann C. Livingston  
Reg. No. 32,479

Date: 7/30/02

CORRESPONDENCE ADDRESS:

Baker Botts L.L.P.  
1500 San Jacinto Center  
98 San Jacinto Blvd.  
Austin, Texas 78701  
512.322.2634



VERSION WITH MARKINGS TO SHOW CHANGES MADE

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IN THE CLAIMS:

Please amend Claims 1, 17, and 35, as set out below.

1. (Previously Amended) A system for directing a selected light beam to at least one light beam receptor, said system comprising:

an array of stationary optical fibers, each one of said stationary optical fibers constructed and arranged to conduct one of a plurality of light beams including the selected light beam;

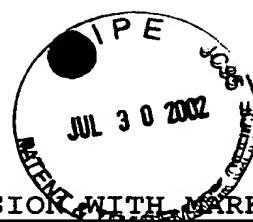
an optical switch fabricated on a substrate, the switch having an array of movable reflective surfaces, and having a single thermal actuator associated with each reflective surface, each thermal actuator comprising a cantilevered arm having a fixed end attached to the substrate and a free end to which the reflective surface is attached, the arm being made from a material having a thermal expansion property, and the arm having a top surface and a bottom surface with a layer of material having a different thermal expansion property on a portion of at least one of these surfaces;

a lens at the end of each optical fiber, operable to direct the light beams to the switch or to collect light from the switch;

wherein each reflective surface is attached such that it is substantially perpendicular to the substrate; and

wherein the optical fibers are arranged around the perimeter of the substrate, such that each reflective surface is moveable into the path of one or more of the optical fibers.

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17. (Previously Amended) A thermally operated optical switch for use in directing a beam of light to at least one receptor, said thermally operated optical switch comprising:

- a substrate;
- an array of reflective surfaces; and
- a plurality of cantilever thermal actuators, each cantilever actuator having a fixed end affixed to the substrate and having a free end to which an associated reflective surface is attached such that each reflective surface has a single associated actuator, and wherein each actuator has a cantilevered arm made from a material having [a] first thermal expansion property, each arm having an upper surface and a lower surface and having a layer of material having a [different] second thermal expansion property on a portion of [at least one] both of these surfaces;

wherein each reflective surface is attached such that it is substantially perpendicular to the substrate.

35. (Previously Added) A thermally operated optical switch for use in directing a beam of light to at least one receptor, said thermally operated optical switch comprising:

- a substrate;
- an array of reflective surfaces; and
- a plurality of cantilever actuators, each actuator having a pair of arms, each arm of the pair having a fixed end affixed to the substrate, and the arms of each pair having a common free end to which an associated reflective surface is rigidly attached, such that each reflective surface has a single associated actuator.

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